

Models FT-1041 and FT-1042 are identical to FT-1051 and FT-1052 but without digital readout capability nor provisions for adding this capability at a later date. Digital value display is also not included.

Specifications subject to change without notice. These specifications supercede previous specifications which have been altered in minor detail.

the models
FT-1051 and FT-1052

SIGNAL
AVERAGERS

Specifications



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FABRI-TEK
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NOISE REDUCING EFFICIENCY

In the Fabri-Tek averagers the input signal is integrated, using a true active integrator, during each sampling period. It is the voltage integral, not the instantaneous voltage or just an approximation to the voltage integral, which is digitized. While all averagers integrate quite accurately under some conditions, only the Fabri-Tek averagers integrate precisely under all conditions including measurements involving multiple input signal channels. While noise reducing inefficiency is not easily noticeable because there usually is no standard for comparison available, it is a fact that the length of time required to reduce noise of frequency comparable to the address advance frequency is decreased in proportion to the fraction of time during which true signal integration takes place.

AMPLIFIERS

The convenient balanced input amplifiers have a gain of 100, and an exceptional common mode rejection ratio of better than 200:1. (Common mode rejection is the ratio of the voltage, such as unintentionally "picked up" power line frequency voltages, appearing on both signal terminals in phase, to the signal voltage appearing across the terminals, for a given amplifier output voltage amplitude.)

SINGLE TRANSIENT CAPABILITY

Since, even at fast sweep speeds, the numbers recorded in the memory are equal to the input voltage and range in size to ± 63 , a fairly good record of even single transients can be made. While not designed with the expectation that a signal averager would very often be used for single signals, this characteristic is a very important part of the overall figure of merit of an averager. In circumstances in which only a few signals are available, and where portions of the signal are very small compared with the more prominent features, useful measurements cannot be made with averagers which produce small numbers in response to even large signal voltages. There is no problem involved if there is a large number of signals available, but in many circumstances there are not enough.

ACCESSORY UNITS

The Fabri-Tek averagers have been designed as the basic instrument of a variety of "systems." The plug-in units at present include only a one channel and a four channel amplifier, but others are being developed, including a magnet field synchronizer for NMR measurements, a one microsecond digitizer, and a pulse height analyzer analog-to-digital converter. Date of availability of these has not been determined.

SPECIFICATIONS

MODEL FT-1051 and FT-1052 SIGNAL AVERAGERS

POWER REQUIREMENTS: 105-125 volt, 60 cps, 1/2 ampere
(230 volt, 50 cps on special order)

SIZE: 16 1/2" wide, 12 1/2" high, 24" deep

WEIGHT: 50 pounds

TEMPERATURE RANGE: 50° - 105° F

FT-101 or FT-100 AMPLIFIER-INTEGRATOR (Each Channel):

Linearity:	±0.5% or better
Sensitivity:	0.015% or better (Expressed as the ratio of minimum measurable signal to size of a full scale signal).
Zero Stability:	2 millivolts per day at constant temperature.
Type of Input:	Balanced or Unbalanced.
Input Impedance:	250K ohms Unbalanced 500K ohms Balanced
Input Signal Amplitude:	±50 millivolts to ±10 volts for full scale deflection.
Minimum Detectable Signal Without Additional Amplification:	50 microvolts for recurrent signals.
Input Signal Coupling:	Selectable AC or DC. DC is direct-coupled. AC is capacitor-coupled with a 0.5 second time constant.
Balanced Input Common Mode Rejection:	Voltage ratio 200:1 or better.
Common Mode Maximum Voltage:	±50 times full scale, up to 20 volts, for DC coupling. For AC coupling, allowable dc offset is 150 volts.
Signal Dead Time During Memory and Arithmetic Operations:	Less than 3% in worst case operation.
Baseline Adjustment:	±2 times full scale.

DIGITIZER:

Digitizing Method:	Serial analog-to-digital converter.
Resolution:	(±)63 ±1/2 counts; Number of counts generated is always proportional to average voltage regardless of sweep speed.

SWEEP CIRCUITS:

Maximum Sweep Speed (Minimum Dwell Time):	50 usec/data point.
Dwell Time Selections:	0.05, 0.1, 0.2, 0.5, 1, 2, 5, 10, 20, 50, 100, 200 milliseconds/data point.

TRIGGER CIRCUITS:

External Trigger:	DC coupling; Threshold adjustable from 0 to +5 volts. Recommended minimum trigger signal is 1 volt positive. Input impedance is approximately 10K ohms.
Internal Trigger:	One sweep follows another automatically after a precise selected delay of from 100 microseconds to 40 seconds.
Trigger Delay:	Delays are digitally controlled using a high stability quartz crystal oscillator. Delay selections are 0.1, 0.2, 0.4, 1, 2, 4, 10, 20, 40, 100, 200, 400 milliseconds; 1, 2, 4, 10, 20, and 40 seconds.

AUTOMATIC STOP CONTROL:

After a switch-selected number of signals have occurred, the measurement is automatically terminated. Selections are 1, 2, 4, 8, 16, 32, 64, 128, 256, 512, and 1024.

MEMORY:

Number of Addresses:	Model FT-1051 has 512 addresses. Model FT-1052 has 1024 addresses.
Division Into Quadrants:	The entire memory may be used for one measurement, or it may be divided into four equal quadrants for four separate signals.
Word Length:	17 bits (Provides ±65,535 number range.)
Data Form:	The recorded data represents the voltage values in millivolts, multiplied by the number of signals measured, when using the most sensitive amplifier-integrator setting.

ARITHMETIC:

The results of each signal measurement are algebraically added to previously accumulated data.

SWEEP COUNTER:

The number of signals measured is recorded in the last memory address. When memory quadrants are utilized individually, the number of signals measured is stored in the last address of those quadrants (127, 255, 383, 511 in the FT-1051 or 255, 511, 767, 1023 in the FT-1052.) This number is read out when using digital display devices. The number serves as the normalizing constant.

MODES OF OPERATION:

± Signal Average:	The two signal averaging modes are used to average a recurring signal which is obscured by random noise.
Interval Histogram:	A positive voltage applied to the trigger input causes a sweep to begin. When this voltage falls below a selected threshold a count is deposited in the then existing address, the sweep ends, and the address scaler is reset.
Frequency Histogram:	Pulses applied to the COUNT INPUT jack are counted into the memory address which exists at the time each pulse occurs. Pulse pair resolution is 50 microseconds.

CATHODE RAY TUBE READOUT:

Input Monitoring:	The output of the serial analog-to-digital converter is monitored to insure proper gain and dc level adjustments.
Memory Content:	The contents of memory may be displayed either as a waveform or as the digital values of individual memory addresses. In multi-input operation the signals may be displayed one above the other. All quadrants may be overlapped or independently positioned on CRT face.
Digital Values:	Any data point selected by the operator is intensified. The digital ordinate value for that point is displayed in the View Digital Value mode.

OUTPUTS AVAILABLE:

Pen Recorder:	Horizontal and vertical deflection signals are provided to operate an external X-Y plotter.
Sweep Output:	Provides a staircase voltage the amplitude of which is proportional to the existing memory address.
Gate Output:	Provides a nominal 3 volt (no load) voltage while a sweep is in progress and remains at ground potential between sweeps.
Address 16 Output:	Provides a nominal 3 volt (no load) voltage when address 16 is reached during a sweep.

ACCESSORIES:

FT-200 Photographic Printer:	Provides a numerical printout on Polaroid film of the values stored in memory. The 4 x 5 film contains the entire memory contents (512 or 1024 values).
FT-299 Camera (Tektronix Type C-30):	The Tektronix Type C-30 camera attaches to the bezel of the averager CRT to record CRT displays. A double exposure will record a waveform and the digital number of sweeps.

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